

What is claimed is:

1. A method to produce hydrogen from a gas containing water vapor, hydrocarbons, and carbon monoxide,

which comprises:

providing a gas containing water vapor and carbon monoxide derived from a biomass, and

providing a flue gas by means of combustion of a biomass, and

providing a catalyst for steam reforming said gas containing hydrocarbons, and

providing a catalyst for steam shifting gas derived from steam reforming containing carbon monoxide, and

subjecting said gas containing water vapor, hydrocarbons, and carbon monoxide to said catalyst for steam reforming to form hydrogen and carbon monoxide, and

subjecting gas following steam reforming containing water vapor and carbon monoxide to said catalyst for steam shifting to form hydrogen and carbon dioxide, and

thereby producing a gas containing hydrogen derived from a biomass.

2. The method of claim 1 wherein said gas containing water vapor, hydrocarbons, and carbon monoxide is subjected to said catalyst for steam reforming to form gaseous hydrogen and carbon monoxide.

3. The method of claim 2 wherein the gaseous hydrogen and carbon monoxide is subjected to said catalyst for steam shifting to form a gas containing hydrogen and carbon dioxide.

4. The method of claim 1 wherein the gas containing water vapor, hydrocarbons, and carbon monoxide is obtained from partial oxidation of a biomass to create solid remains.

5 The method of claim 4 wherein the remains are subjected to combustion by air to create a flue gas and a residue containing inorganic solids.

6 The method of claim 5 wherein the residue containing inorganic solids is used to heat air for combustion and produce a residue containing inorganic solids of reduced sensible heat.

7 The method of claim 5 wherein the flue gas is used to supply heat to replace exothermic heat to catalysts for steam reforming and steam shifting and produce flue gas of diminished sensible heat.

8 The method of claim 7 wherein the flue gas, of diminished sensible heat, is utilized within a dryer to remove water from a biomass and produce flue gas to be discarded.

9. The method of claim 1 wherein the method is continuous.

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10. The method of claim 1 wherein said gas containing hydrogen, derived from a biomass, is separated from the gas to produce hydrogen substantially devoid of impurities.
11. The method of claim 1 wherein said gas containing hydrogen, derived from a biomass, is separated from the gas in a medium to store hydrogen for release.
12. The method of claim 4 wherein the biomass is selected from the group consisting of wood, waste paper and municipal solid waste including an individual or a combination of these materials thereof.
13. The method of claim 1 wherein said gas containing hydrogen, derived from a biomass, provides energy to operate a fuel cell.
14. The method of claim 1 wherein said combustion is supplied by air to maintain a heat balance within the method.
15. The method of claim 1 wherein said water vapor is supplied from moisture contained within a biomass.

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